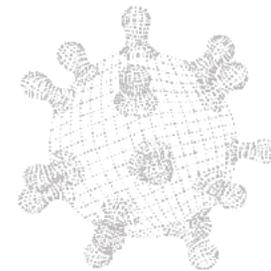


POST-CORONAVIRUS SUPPLY CHAIN RECOVERY

THE JOURNEY TOWARDS THE NEW NORMAL

A DHL perspective on the impact of the COVID-19 pandemic on supply chains and logistics



Contact us



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Preface

As we write this, the world is still in the middle of a historic pandemic caused by the novel coronavirus SARS-CoV-2.

This pandemic affects every aspect of our private and business lives:

- the global economy and global trade
- industries and individual businesses
- politics
- the way we live, travel and interact and
- supply chains around the globe.

Many say that this pandemic will change the world forever.

For a post-pandemic world, this crisis will accelerate changes that had already begun, and at the same time unveil new trends and new priorities. As a result, consumers, businesses, and supply chain managers will find themselves in a 'new normal'.

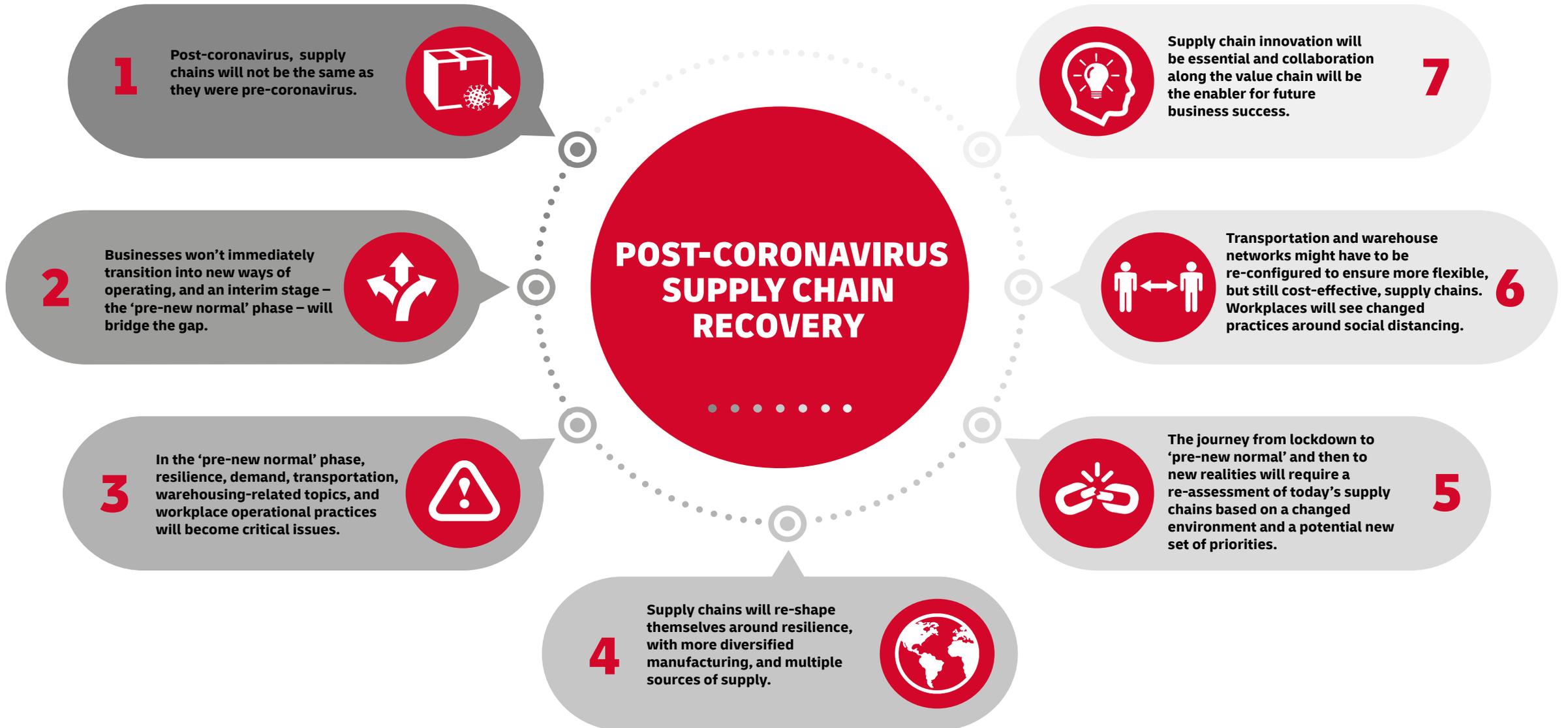
In this paper we outline the shape of the "new normal" from a supply chain perspective, in order to help you answer the following questions:

- **What are the characteristics** of a new normal relevant for supply chains? How does a transition to a new normal via a 'pre-new normal' phase look like?
- **What are the post-coronavirus impacts** on supply chains and how can supply chain management contribute to future business success?
- **What are the long-term lasting lessons** to consider as a supply chain decision maker?
- **What are the actions to be taken** and success factors in order to build the resilient supply chain of the future?

We believe that there is no single solution to the opportunities and challenges ahead caused by the coronavirus pandemic. We therefore invite you, our customers and partners, to discuss those challenges, and to explore innovative supply chain solutions in the near future.



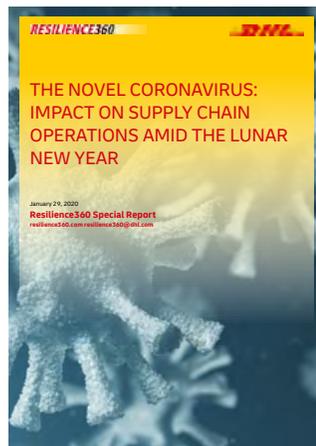
EXECUTIVE SUMMARY



SUPPLY CHAIN DISRUPTIONS

The spread of the novel coronavirus SARS-CoV-2 is first and foremost “a public health emergency of international concern” as declared by the World Health Organization.

However, even in its very early stages, its significant impact on supply chains and the crucial role of supply chain management became obvious. It has become more clear that the essential role of the logistics industry is to keep supply chains operating around the globe. Hence there is a remarkable story to be told about the sector that supports our well-being in every possible dimension; one that continues to unfold.



DHL Resilience360 published a **Resilience Report, “The Novel Coronavirus: Impact on Supply Chain Operations amid the Lunar New Year”** on 29 January 2020. Even at this very early stage, the report highlighted severe disruptions to air cargo, as well as congestion for vessels on the Yangtze River near Wuhan, highlighting the likelihood of impending supply chain disruptions.

Starting early March with northern Italy followed by most of Europe and North America, more and more countries went into lockdown with most non-essential commercial activity halted and people confined to their homes. As an example, beginning of April 2020 in Europe, more than 1 million of the 2.6 million auto workers had been furloughed at large car manufacturers and suppliers.

With border closures to international visitors and other travel restrictions, airlines either completely or mostly suspended their entire operations, leading to a significant contraction of cargo capacity. Freighters and charter capacity was used to deliver essential medical equipment; other shipments were switched to alternative modes such as ocean or rail transport.

In summary, the resilience of supply chains was tested in unexpected ways. However, the following economic crisis was not driven by collapsing supply chains but a significant lack of consumer demand. Hence, any shape of recovery depends on the speed and magnitude of consumer spending behavior.

Short- and long-term it seems inevitable that supply chains will be different. In the wake of the still ongoing pandemic many lessons have been learned already; a desire for more resilient and flexible supply chains has become more prominent. As countries begin to emerge from lockdown, businesses are contemplating those lessons, and beginning to consider exactly how supply chains will differ between yesterday and tomorrow.

Even allowing for an element of hype, over-reaction or exaggeration, it seems almost certain that a return to normality will herald a new normal that is very different from the old normal.



TRANSITION TO THE ‘PRE-NEW NORMAL’

Businesses and their supply chains won’t transition to the new normal immediately. Its shape, for one thing, isn’t yet clear. We see its outlines, but not all the fine detail.

However, it is simply not practical to go from today’s crisis situation to immediate, full operation.

So it makes sense to think about and plan for an intermediate phase: one that we can actually envisage more precisely, and begin to understand.

We call this intermediate phase the ‘pre-new normal’.

At its start, countries and their businesses will be emerging from lockdown, and beginning to engage once more in economic activity with production and sales increasing.

At its end, the ‘new normal’ will have arrived. In between there will be a period of indeterminate duration, longer in some countries and industries than in others, of adjustment.

LASTING LESSON

“The Covid-19 coronavirus has been a huge wake-up call. Businesses that had considered their supply chains to be resilient suddenly found out that they weren’t.”

“Businesses and industries that had resisted change suddenly found themselves embracing it.”

“Consumers used to abundance found themselves dealing with scarcity. Will things go back to as they were before? No: too many lessons have been learned.”

Omera Khan – Professor of Supply Chain Management at Royal Holloway, University of London



It makes sense to think about and plan for an intermediate phase

KEY SUPPLY CHAIN DRIVERS

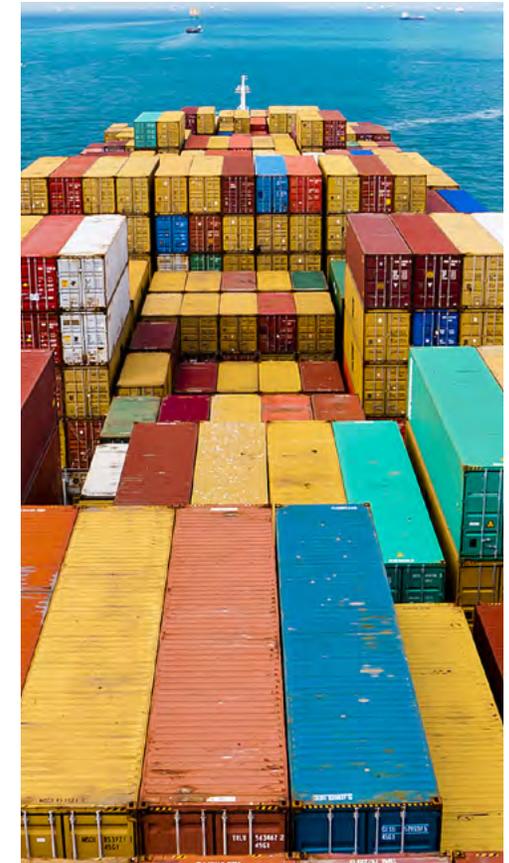
How best to explore these scenarios? Clearly, the transition environments will affect different industries in different ways, and probably at slightly different times: aerospace and automotive may be slower to recover than, for example, life sciences, healthcare, and the foodstuffs supply chain.

Accordingly, it perhaps makes most sense to view these scenarios through the lens of how they are shaped by the post-coronavirus impact of key supply chain driver categories:

- **Resilience**
- **Demand**
- **Transportation & warehousing**
- **Workplace operational practice**

In each scenario, we explore what the ‘new normal’ might look like, describe the likely shape of the ‘pre-new normal’, and briefly weave in what might be termed the lasting habits that will emerge as businesses adjust to a post-coronavirus world.

We also briefly address, where pertinent, any noteworthy sector or industry ramifications not otherwise addressed.

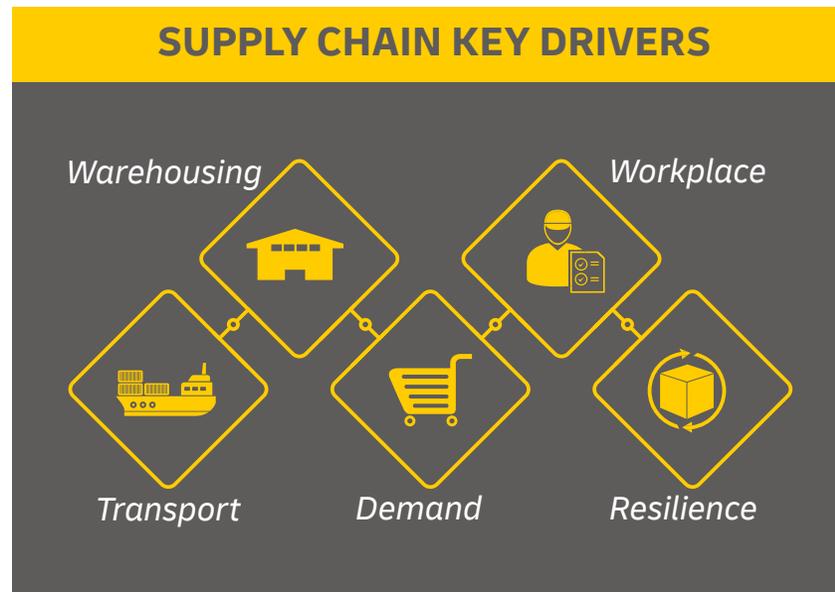


Shipping congestion was an early disruptor

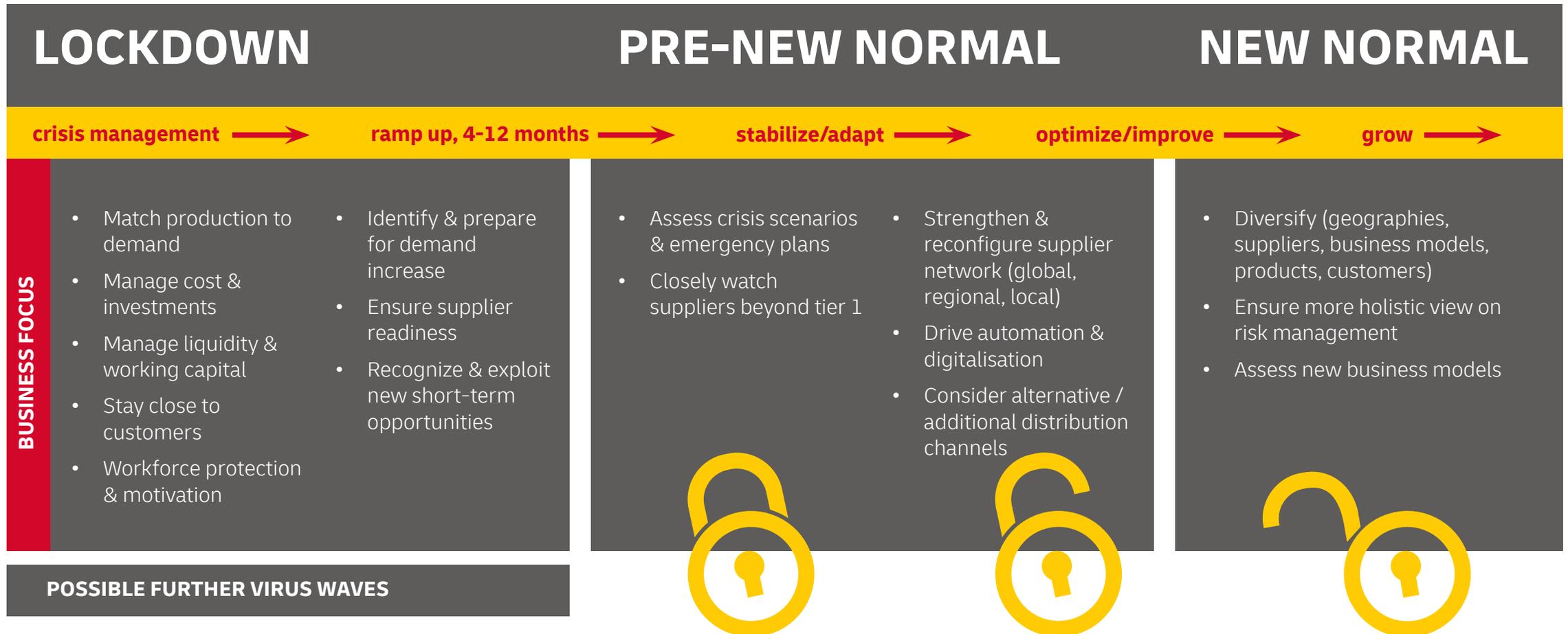
LASTING LESSON

“Re-starting operations is already a challenge under normal circumstances. In a volatile post-lockdown situation companies have to adjust ramp-up speed even on a daily basis. Watching operations and supplier readiness as well as anticipating customer demand are crucial.”

Eric Gantier – President DHL Engineering, Manufacturing and Energy Sector



THE JOURNEY TO THE NEW NORMAL



POSSIBLE FURTHER VIRUS WAVES

OPERATIONS AND STRATEGY

RESILIENCE

Resilience is often thought of as an operational issue, focused on securing the supply from first-tier suppliers. In general, few organisations extend resiliency planning further upstream to their second- or third-tier suppliers.

In future, supply chain managers, planners and procurement professionals may well consider further tiers as they make decisions about sourcing, inventory buffers, and

transportation routes. Sometimes overlooked, there is also a strategic dimension to resilience.

The risk profile of a supply chain is generally 'locked in' within the early stages of strategic development. Ensuring that the processes to achieve supply chain transparency and continuous monitoring are embedded at an early stage of supply chain design is recognised as good practice,

though this, too, may not receive sufficient attention. The coronavirus pandemic has exposed resiliency weak spots, both for countries and businesses.

For example, it transpired that the active ingredients for a number of important pharmaceutical products were manufactured in China, in factories then under lockdown.

As United States trade representative Robert Lighthizer told G20 trade ministers at the end of March: "We are learning in this crisis that the overdependence on other countries as a source of cheap medical products and supplies has created a strategic vulnerability to our economy."

LASTING LESSON

"The coronavirus pandemic has demonstrated to governments – yet again – how supply chains are vulnerable to far-away events in far-away places. Going forward, businesses can expect both regulatory and social pressure to ensure that they are more resilient to such shocks, with stocks maintained of critical products."

Stephan Freichel – Professor of Distribution Logistics at Köln University of Applied Sciences



Those that relied on global supply chains for their products were left vulnerable

OPERATIONS AND STRATEGY

RESILIENCE

Parallel sentiments have also been expressed by Peter Navarro, the White House's trade and manufacturing adviser, who has argued for pharmaceutical supply chains to be repatriated back to the United States, in order to "simultaneously reduce America's foreign dependencies, strengthen its public health industrial base, and defend our citizens, economy, and national security."

The European Commission has equally become acutely aware of Europe's reliance on Asia for the production of personal protective equipment, and is working with European manufacturers to establish greater manufacturing capacity in Europe, in part on an emergency basis by re-purposing existing production lines.

Implicit in the operational view is that resilience is cost-neutral: there might be a cost, to be sure, but it is often well worth paying for the resulting added protection and peace of mind. As those costs increase, the decision as to whether the price is worth paying is made at an increasing level of seniority.

Clearly, this points to a rise in the prominence of senior supply chain executives within the corporate hierarchy and decision-making process.

LASTING LESSON

"We are moving from an era marked by an emphasis on procurement for cost, to an era marked by an emphasis on procurement for resilience."

Richard Wilding – Professor of Supply Chain Strategy, Cranfield School of Management



COVID-19 has sharply exposed the international nature of many supply chains

SUPPLY CHAIN CONFIGURATION

RESILIENCE

Diversification of supply chains for more resilience was already considered by many businesses prior to the coronavirus pandemic.

Exposure to the supply chain disruption stemming from natural disasters was one impetus.

For instance, consider the flooding in Thailand in October 2011, which submerged seven of the country's largest industrial zones for several weeks, including two zones with factories belonging to two of the world's largest manufacturers of computer hard drives.

According to a *New York Times* report, of the 227 factories in Thailand's Khlong Luang industrial zone, only 15% had restarted production six months later.

Trade tensions, too, have contributed to the move towards more-diversified supply chains. Political rhetoric is one thing, but actual tariffs and import quotas quite another and businesses are responding accordingly.

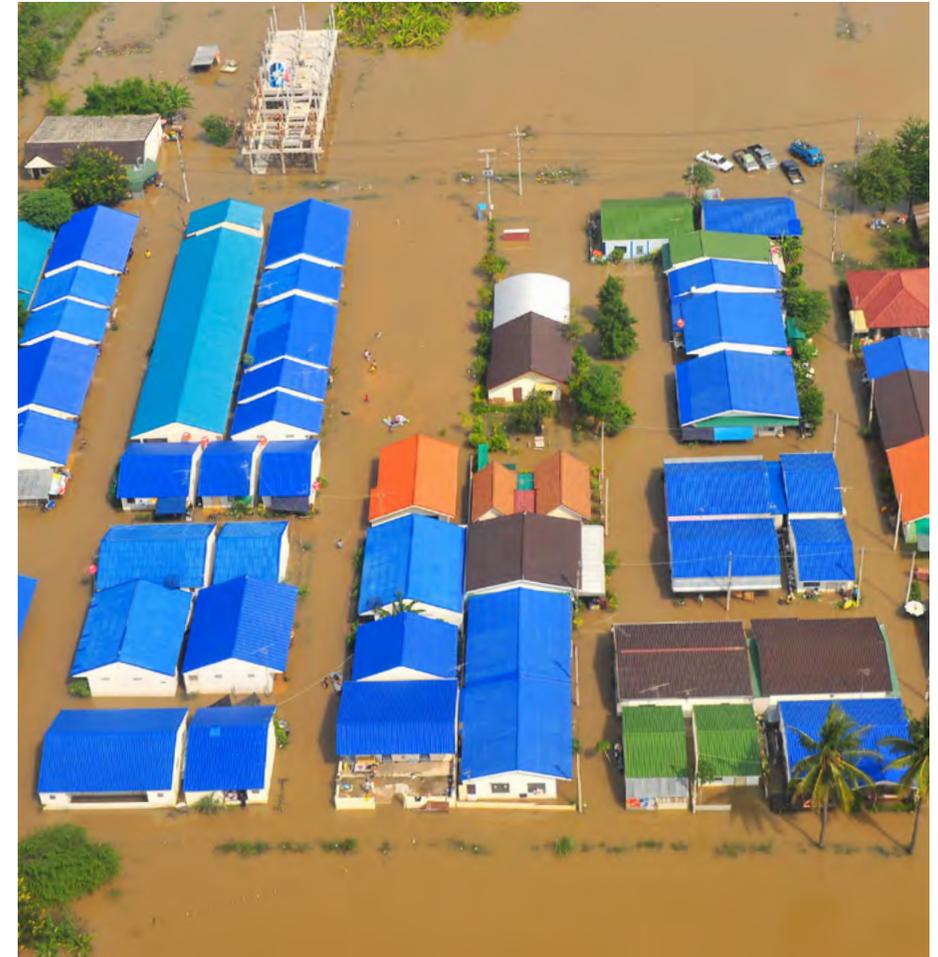
For all these reasons, then, an era is dawning in which the configurations of supply chain networks are being reviewed. Businesses are beginning to re-assess manufacturing, transportation and warehouse networks, or alternatively invest in far higher inventory buffers, or other courses of action they judge will provide them with long-term stable security of supply.

In this 'new normal', cost efficiencies may now be seen as of secondary importance.

Supply Chain 4.0 was already driving businesses towards this direction, investing in smaller and more widely dispersed warehouses in closer proximity to customers, rather than large centrally located facilities.

The impact of the lockdown has highlighted the added benefits and flexibility of these more distributed networks, and although their inventory holding costs may be higher, the result is greater speed to market and improved resilience.

Flooding in Thailand in October 2011 submerged seven of the country's largest industrial zones for several weeks



TIMESCALES AND PLANNING

RESILIENCE

Of the various scenarios that we discuss, the pre-new normal as it relates to resilience is likely to be of a longer gestation period of transition than most others.

As lockdowns were imposed, crisis management was inevitably the order of the day. Emerging from those lockdowns, organisations are just as inevitably moving into the pre-new normal – re-starting and then ramping-up production, gradually adapting and stabilising their operations, followed by a period of optimisation and improvement before returning to growth and the new normal. And somewhere along the way, opportunities are also likely to emerge.

Not only will the transitions take time, but when that new normal involves relocating production or sourcing in order to enhance resilience, that timescale is likely to become even more protracted.

It takes time to build and equip factories, move and relocate production lines, and qualify and contract with manufacturers. Industries will move through this process at different speeds: as a rough guide, the greater the capital investment involved, the longer the timescale.

Bear in mind, too, that it is not just a factory or production line that is moving: in most cases, it will be an entire supply chain, as well.

Nor can it be assumed that the newly configured supply chain that traditionally provided parts or materials will be available: former suppliers may have moved as well, or simply no longer be in business.

In short, diversification often requires the development of completely new supply chain networks and infrastructure. In the other scenarios, the pre-new normal is likely to be measured in months; for

resilience, little on-the-ground progress can be accomplished in such a short timescale.

But nevertheless, there will be progress. Executive boards will consider position papers and make decisions; feasibility and planning studies will commence; conversations will occur.



It takes time to build and equip factories, move and relocate production lines

LASTING LESSON

“The last weeks and months let us suffer from the coronavirus pandemic, and sharpened our view towards some basic elements of our business. Reliable supply chains are at least equal to our ‘need for speed’, having strong partnerships is better than having customer-client relations, and shared transparency is a key for successful supply chains. And what is more: we as logistics industry are a key element for our daily life in all aspects. Let’s act accordingly in the future and create together more value for social and industrial life.”

Matthias Braun – Head of Digitalization and Concept Development, Volkswagen Group Logistics

LESSONS FROM JAPAN

RESILIENCE

Perhaps the best model of what to expect is the automotive industry's response to the Japanese earthquake and ensuing tsunami of 2011. This brought massive disruption, spreading far beyond the immediately-affected assembly plants of Toyota, Suzuki and Nissan located in the disaster zone.

Within hours of the disaster, the finely-honed supply chains of assembly and component plants elsewhere in Japan were hit by parts shortages, spreading further disruption far beyond Japan's own shores, affecting automakers as diverse as Ford, Volvo, GM, Renault, Chrysler, and PSA Peugeot Citroën.

But the industry quickly learned two important lessons. First, that auto-makers and manufacturers needed to know more about the physical locations of its tier-2, tier-3, and tier-4 suppliers, having discovered, too late, that many of them were clustered in the north-eastern corner of Japan.

And second, that single-sourcing carried risks when single-sourcing involved not just a single supplier, but a single factory.

So too with coronavirus: lessons will have been learned. But it takes time to formulate and execute the appropriate actions in response.



The Japanese earthquake of 2011 brought massive disruption, far beyond the immediately-affected assembly plants

LASTING LESSON

“In these volatile times, supply chain visibility and control have never been more important. Control tower concepts and data analytics capabilities must be upgraded to meet new demand patterns, support growth opportunities, and manage greater external risks.”

Alexander Gunde – President DHL Technology Sector

TRANSITION TO THE PRE-NEW NORMAL

RESILIENCE

ACTION CHECKLIST FOR SUPPLY CHAIN EXECUTIVES

- Map supplier networks beyond tier 1 up to tier 3, focusing on value-adding manufacturing and distribution locations
- Assess supplier health and readiness, including business continuity plans and emergency alternatives
- Understand the supply chain network flows: never assume that goods take the most direct route. Liaise with your logistics providers
- (Re-)assess warehouse and distribution networks based on a new set of supply chain priorities, i.e. resilience, customer proximity and demand patterns, sales channels, supplier locations, etc
- Map inventory locations and where stock is held. Focus not on stock value, but on the number of items and the duration of cover, i.e. the number of days of inventory held under a specific level of customer demand
- Collaborate, Collaborate, Collaborate: ensure relationships are managed effectively across the supply chain. Managing relationships requires processes, information systems and people resource



Collaborate, collaborate, collaborate!

THE XIRALLIC TALE

For example, a metallic paint pigment called Xirallac was produced at only one factory in the world, located in the Japanese coastal town of Onahama.

Xirallac, it turned out, was used by manufacturers as diverse as Chrysler, Toyota, General Motors, Ford, and Volvo. In the event, it was to be eight weeks after the earthquake that production was eventually restored.

No longer is Xirallac sole-sourced: a spokesperson from the manufacturer (Merck KGaA in Germany) told Reuters in 2016 that the company now keeps 'multi month' stocks of Xirallac at warehouses in Japan and other regions around the world. And in addition, a second production line was opened up, in Germany in 2012.

JUST-IN-CASE REPLACES JUST-IN-TIME

DEMAND

The photographs and television pictures were stark. Long before countries went into lockdown, their supermarket shelves were stripped bare. Pasta, toilet paper, painkillers, canned tomatoes, flour – all gone.

And as the prospect of lockdown loomed, things got worse. Across Europe and North America, the story was the same. The closer lockdown loomed, the more consumers responded by panic-buying. In the end, lockdown, or even fears of lockdown-induced supply chain disruption, was no longer the trigger.

People were panic-buying because other people were panic-buying.

As a result, at each upstream link in the supply chain, orders were amplified, as buyers attempted to re-stock shelves. Supermarket chains attempted to help by sharply pruning their ranges, so that manufacturers could conserve capacity by not switching from SKU to SKU.

And yet actual food consumption barely moved. People weren't actually eating more flour or pasta or canned tomatoes. Base consumption levels were largely unchanged.

Nor was this solely a consumer-related phenomenon. Many industrial supply chains responded in a similar way: time and again, it has been shown that industry's favourite strategy in times of uncertainty is to stockpile – as was most recently seen on both sides of the Channel as Brexit uncertainty peaked.

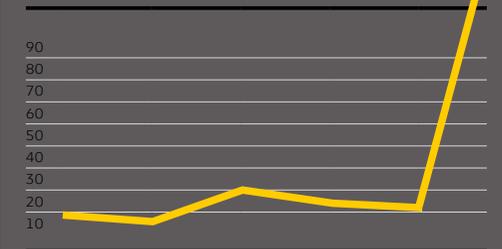


Even fears of lockdown induced supply chain disruption

LASTING LESSON

“In the new normal, if your supply chain is the same as the one that you had pre-coronavirus, you’re probably doing something wrong.”

Richard Wilding – Professor of Supply Chain Strategy, Cranfield School of Management



JUST-IN-CASE REPLACES JUST-IN-TIME

DEMAND

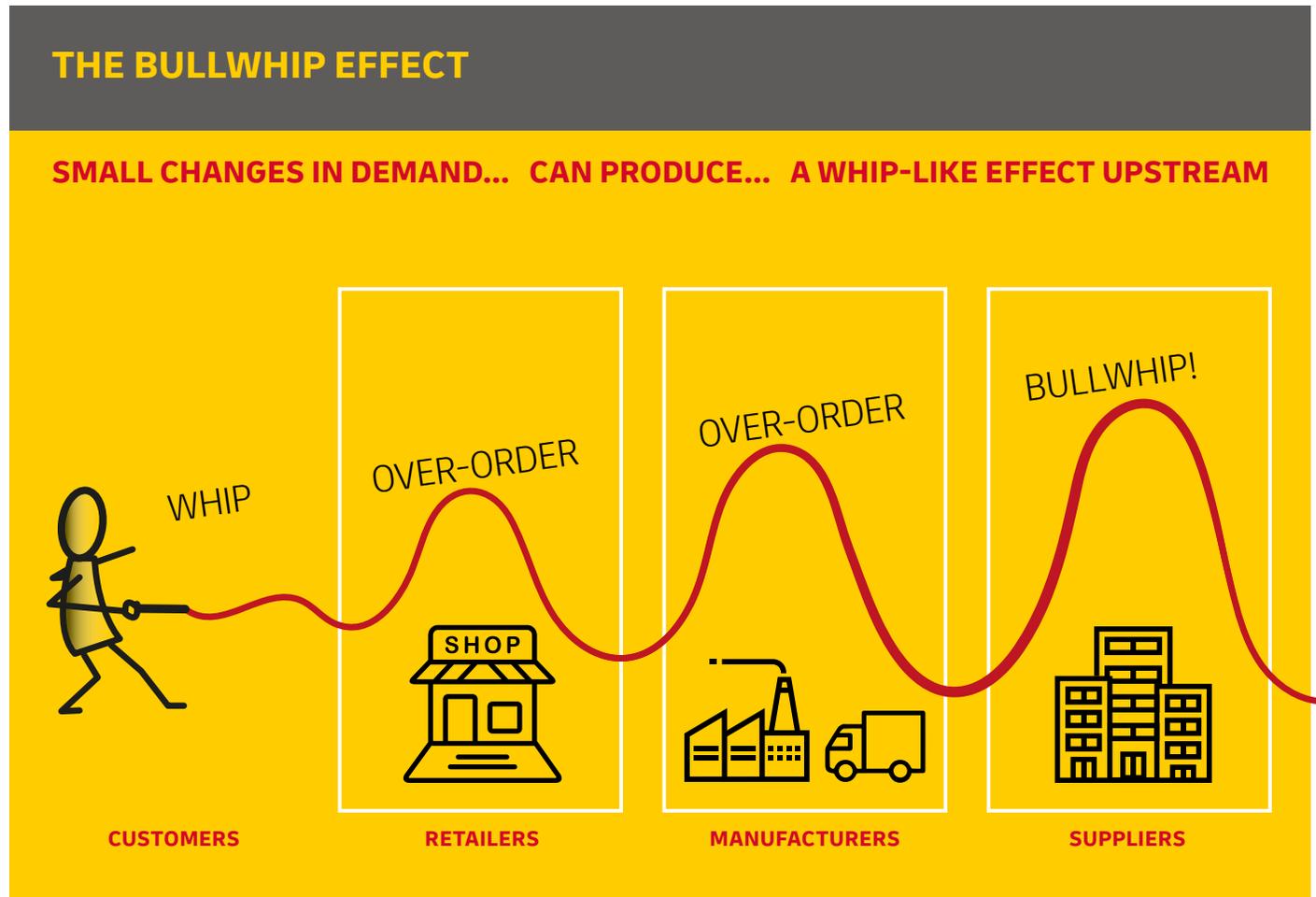
As supply chain professionals know all too well, this is the bullwhip effect in action: just like a bullwhip, the amplitude of demand fluctuations increases as the distance from the origin increases. A small movement with the hand produces a significantly greater movement at the tail of the whip.

The bullwhip effect, to a greater or lesser extent, is likely to be a feature of the post-coronavirus new normal. For consumers and businesses within consumer-based supply chains, 'just in case' is likely to replace 'just in time'.

Three factors may affect this change:

- The bullwhip effect takes a considerable time to dampen down
- Social distancing and similar health protocols are likely to result in consumers making fewer (but larger) shopping trips to supermarkets
- Supply chains will be experiencing oscillations for months to come, as supply shortages and economic dislocation distort true underlying long-term demand.

Supply chains will be experiencing oscillations for months to come



UNDERLYING DEMAND

DEMAND

But what will ‘true long-term underlying demand’ actually look like? Post-coronavirus, the level of long-term aggregate consumer demand, which typically drives around two-thirds of a typical country’s GDP, is difficult to predict.

What is clear is that the new normal is likely to involve quite different patterns and priorities in what consumers are demanding. And industry, in turn, will mirror those differences.

As an example of this, and particularly in the absence of a vaccine, consumers are likely to prioritise home-based activities over those that involve exposure to potentially risky social environments.

Visits to bars, restaurants, sports events and cinemas will be avoided or reduced, while home baking, do-it-yourself, watching television, and playing video games might well experience a surge in

popularity. Foreign vacations might be less popular, freeing up money for other activities and consumer goods.

Expenditure on healthcare and personal protection products such as masks, gloves and visors, is likely to increase, while elsewhere it will decline. In the absence of a vaccine, there will certainly be some impact on the distribution of expenditure as well as the total. Nor is it solely consumer-facing supply chains that will be affected. Across a variety

of sectors, even though it is difficult to make precise predictions, it is likely that long-term demand patterns will be disrupted.

Power generation, oil consumption, the automotive industry, aircraft manufacture – few sectors will be entirely immune. And not all the effects will necessarily be entirely adverse: the automotive industry, for instance, should see a greater demand for autonomous vehicles.

LASTING LESSON

“Safe and convenient, the pandemic has given online shopping a significant boost, accelerating its growth. But retailers, and their customers, must understand their true cost-to-serve. So far, few do.”

Richard Wilding – Professor of Supply Chain Strategy, Cranfield School of Management



It is likely that long-term demand patterns will be disrupted

TRANSITION TO THE PRE-NEW NORMAL

DEMAND

What of demand during the pre-new normal? It will be a period of transition, during which long-term consumer demand starts to evolve, and during which businesses, and their supply chains, will need to be agile and responsive.

A far cry, in short, from today's lockdown-induced extended lead times and shortages. It will also, if the predictions are borne out, be a period of recession, during which demand will be more fragile than would otherwise be the case.

In general, it is reasonable to expect that the high-amplitude bullwhip effect that was in place at the start of lockdown will gradually diminish as economic activity returns, although not completely vanish. Linked to this will be the likelihood of consumers buying through multiple channels, partly as they diversify their supply bases so as to maximise security of supply, and partly as they make more

use of online shopping so as to minimise face-to-face exposure to potentially risky retail environments. Related data points hint at the landscape:

- **For Europe**, e-commerce volumes in May 2020 grew 89% versus last year. In Europe's largest e-commerce market, the UK, 24% of consumers suggest they will continue shopping as they do now once life returns to normal¹
- **UK-based supermarket retailer Tesco's** online sales grew 49% in Q1 2020 and more than 90% in May, while overall group sales rose 8%
- **And in the US**, Walmart's e-commerce sales grew 74% in Q1 2020, while Target's online sales grew 141% for its fiscal Q1 2020 ended May 2

1: CCInsight, May 2020 'Geography Latest Trends'; yStats.com: Covid-19 impact on global B2C ecommerce and online payments 2020



There are signs that demand is weakening for higher-priced consumer technology

TRANSITION TO THE PRE-NEW NORMAL

DEMAND

As example, for Tesco the shift has come at a price, and the company's share price reflects the significant increase in associated costs that it has reported.

The cost-to-serve of online groceries is significantly higher, eroding margins, with consumers accustomed to free or low-cost deliveries.

More strategically, there are grounds for expecting online shopping to increase for other reasons than health concerns.

Given coronavirus-induced volatility in demand, and changing tastes, and given also the difficult trading environment posed by recessionary economic conditions, it is reasonable to expect a

growth in direct-to-consumer selling, sidestepping normal retail channels, even in industries that have traditionally relied heavily on established retail channels to market.

Using the example of consumer technology, direct-to-consumer activity has hitherto been a relative

rarity, associated with higher-priced manufacturers such as Apple and Bang & Olufsen.

Seeing higher levels of customer intimacy enjoyed by brands with direct-to-consumer exposure trading relationships, other manufacturers may wish to increase their own

exposure to direct-to-consumer sales to achieve similar levels of customer intimacy.

There are grounds for expecting online shopping to increase

ACTION CHECKLIST FOR SUPPLY CHAIN EXECUTIVES

- Ensure you know the true cost-to-serve of a particular channel to market
- Granularity of data is vital: know your cost drivers, true customer demand, service level, and value density – by both product type and SKU
- The real lesson from the explosion in online delivery capacity is that when it mattered, the impossible happened
- Document how you responded: you may need that playbook again



TRANSPORTATION NETWORKS

TRANSPORTATION & WAREHOUSING, WORKPLACE

Diversification of supply chains and new configurations of manufacturing, distribution and warehouse networks might require changes in network flows and transportation modes.

Although these changes might take time to be conceived and put into operation, it is worth noting that even at the time of writing, new modes of transportation are arriving, such as expedited ocean freight. The same holds true for rail freight services, for example from China to Europe and vice versa.

Featuring point-to-point routings, fast steaming, and 'white glove' dedicated expedited handling at through ports, the appeal is obvious. As the new normal slowly emerges, it is likely that more such offerings will be leveraged.



Higher prevailing air freight prices and a lower real demand for air freight, can be expected to reinforce the trend away from air

SOCIAL DISTANCING IMPACT

TRANSPORTATION & WAREHOUSING, WORKPLACE

In parallel to all this, transportation-related and workplace-related changes connected with social distancing and disease prevention can be expected, at least until an effective vaccine emerges.

As supply chain professionals know all too well, logistics is also a people business, in which employees work in shipping offices, warehouses, crossdocks, ports, and airports.

In certain industries, warehouses and picking faces are densely populated – think of online retail.

Longer term, this can be expected to accelerate the trend towards working from home in the case of office-based workers (which may in turn accelerate the pace of digitalisation initiatives), and towards robotics and automation in the case of physical goods handling.

Finally, it is worth making the point that different working practices, including increased working from home, will not necessarily be damaging to productivity, something that perhaps runs counter to many businesses' expectations.

Hard evidence of this has yet to formally emerge, but a number of businesses have already offered early anecdotal evidence that streamlined processes and efficiencies have resulted from their lockdown-induced new working practices.

Differences in both corporate culture and national culture, however, are likely to lead to differences in the ability of organisations to benefit from this.

Accordingly, supply chain leaders may wish to develop appropriate skill sets in order to successfully implement and operate these new working practices.



LASTING LESSON

“Post COVID-19 companies will care even more about resilient supply chain operations. More than ever before leveraging foresight and logistics innovation will be key for logistics professionals. Trends outlined in the DHL Logistics Trend Radar such as creating a collaborative human-machine workforce are significantly gaining in importance.”

Matthias Heutger – Senior Vice President Global Head of Innovation & Commercial Development DHL

As supply chain professionals know all too well, logistics is also a people business

TRANSITION TO THE PRE-NEW NORMAL

TRANSPORTATION & WAREHOUSING, WORKPLACE

If the new normal is the end point, then the pre-new normal is the transition scenario. As with moves to enhance resilience, the transition may not necessarily happen at speed: major shifts in transport modes or routings are not undertaken lightly, or without detailed investigation, and the resulting timescales will reflect this.

It is also true that when transportation decisions are predicated upon decisions to, say, switch manufacturing and warehousing locations, or source from elsewhere, then those decisions must first be taken and executed.

From a workplace perspective, configuring post-coronavirus workplaces to meet social distancing and sanitising guidelines is also likely to take some time, with early measures being taken on an emergency basis, and fuller measures being contingent upon capital expenditure, building alterations,

LASTING LESSON

“Just as procuring for resilience rather than cost will become an increased focus, remote working will disrupt established processes, providing fresh impetus to digitalisation and automation initiatives.”

Richard Wilding – Professor of Supply Chain Strategy, Cranfield School of Management

professional advice and design, and employee consultation.

Likewise, many warehouses and warehouse processes will need to be reconfigured to reflect the requirements of a socially distancing workforce, with changes such as one-way systems, distributed picking faces, socially distanced packing areas, and hand-sanitiser stations. This can be supported by technology such as IOT, further automation, and robotics.

For remote working, information systems will need to be robust, and capable of supporting a distributed workforce, providing access to appropriate data and systems.

Again, supply chain leaders will need to think how best to manage, motivate and develop a workforce in this new environment.



Configuring post-coronavirus workplaces is likely to take some time

TRANSITION TO THE PRE-NEW NORMAL

TRANSPORTATION & WAREHOUSING, WORKPLACE

LASTING LESSON

“The requirement for greater social distancing within warehouses and supply chain operations can only accelerate investment in automation and robotics, driving greater digitalisation. IoT devices, sensors, wearable devices, AGVs, drones, and ‘swarms’ of autonomous shuttles: the emphasis now isn’t on efficiency so much as reducing the population density of the workplace, and improving human machine collaboration.”

Jan Cirullies – Professor at Dortmund University of Applied Sciences and Arts, and Senior Scientist at the Fraunhofer Institute for Software and Systems Engineering



Warehouse processes will need to be reconfigured to reflect social distancing

ACTION CHECKLIST FOR SUPPLY CHAIN EXECUTIVES

- Re-assess the trade-off between lead-time vs. transport cost: existing assumptions may no longer hold
- Review the implications for property: existing locations and layouts may no longer be appropriate
- New processes and ways of working require appropriate skills: businesses should actively invest in these areas
- Information systems will need to fully support a remote workforce: crisis-level working practices and systems won't be adequate over the long term
- Supply chain innovation will be essential for future business success and close collaboration along the value chain – including logistics service providers – will be the enabler for this

SUMMARY ACTION CHECKLIST FOR SUPPLY CHAIN EXECUTIVES

RESILIENCE

- **Map supplier networks** beyond tier 1 up to tier 3, focusing on value-adding manufacturing and distribution locations
- **Assess supplier health** and readiness, including business continuity plans and emergency alternatives
- **Understand supply chain network flows:** never assume that goods take the most direct route. Liaise with your logistics providers
- **Map inventory locations and where stock is held:** focus not on stock value, but on the number of items and the duration of cover, i.e. the number of days of inventory held under a specific level of customer demand
- **(Re-)assess warehouse and distribution networks** based on new set of supply chain priorities, i.e. resilience, customer proximity and demand patterns, sales channels, supplier locations, etc
- **Collaborate, Collaborate, Collaborate:** ensure relationships are managed effectively across the supply chain. Managing relationships requires, processes, information systems and people resource

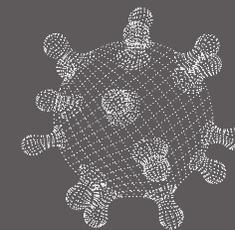
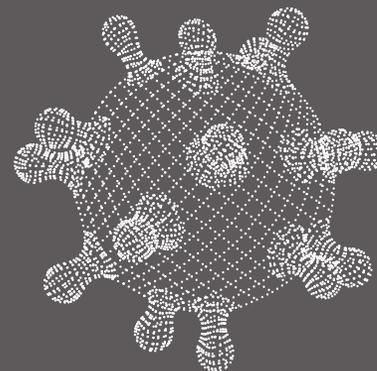
DEMAND

- **Ensure you know the true cost-to-serve** of a particular channel to market
- **Granularity of data is vital:** know your cost drivers, true customer demand, service level, and value density – by both product type and SKU
- **Document how you responded:** you may need that playbook again

TRANSPORTATION & WAREHOUSING, WORKPLACE

- **Re-assess the trade-off** between lead-time vs. transport cost: existing assumptions may no longer hold
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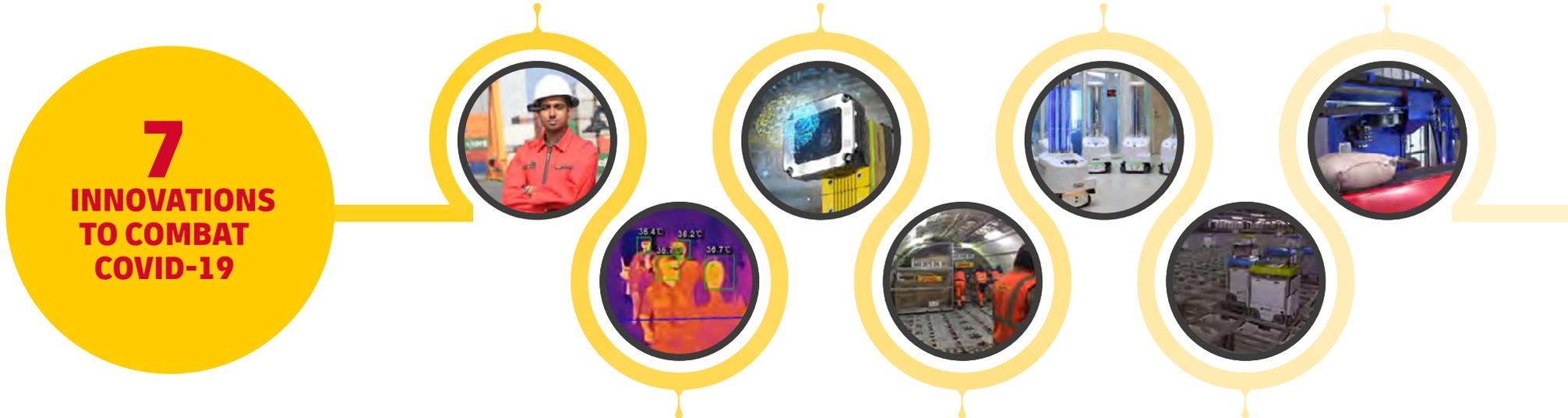
The real lesson: when it mattered, the impossible happened



CONCLUSIONS

- **Post-coronavirus**, it is clear that a new normal will emerge. Going forward, industries and supply chains will not be the same post-coronavirus as they were pre-coronavirus
- **The exact shape** of that new normal is uncertain, although its broad outlines are emerging
- **What is certain**, though, is that businesses won't launch abruptly into this new normal: as this paper has argued, an interim stage, called the 'pre-new normal', bridges the gap between lockdown and the new normal, and is crucial for short- and long-term business success
- **Forecasting is never an exact science**, and not every potential implication may come to pass exactly as expected
- **Supply chains will have to be re-assessed** towards higher resilience, flexibility, and robustness
- **Innovation and scaling new technologies** such as robotics and automation, IOT, and data analytics will be crucial to success
- **Most of the current pandemic learnings** and future implications will lead to a much more important role for supply chain management and logistics

The world is changing, and businesses – as well as supply chains – must change with it.



1 REMOTE SITE SUPPORT

Challenge
Travel restrictions limit site visits. Social distancing limits building capacity for visitors.

Innovation
See-what-I-see collaboration tools using smartglasses.

2 CONTACTLESS SCANNING

Challenge
Hand scanners shared between workers become a potential disease vector.

Innovation
Presentation scanner allows for contactless scanning within milliseconds.

3 DISINFECTION ROBOTS

Challenge
Heightened facility disinfection needs introduce costly operational challenges.

Innovation
Autonomous mobile robots equipped with UVA/UVB lamps designed for clinical environments can be adapted for use in warehouses during downtime.

4 TRAILER (UN)LOADING ROBOTS

Challenge
Trailer loading and unloading can require multiple people working in close proximity.

Innovation
Semi-automated container unloading system with integrated conveyor belt and articulated robotic arm operated by one person.



5 VIRUS DETECTION SCANNING

Challenge
Managing physical distancing and preventing access of infected persons.

Innovation
Computer vision software techniques can detect proximity of persons for social distancing and contact tracing in a given facility.

6 LIFTING & PUSHING EXOSKELETONS

Challenge
Can require multiple people working in close proximity.

Innovation
Exoskeletons can assist workers for lifting, lowering, loading, and unloading heavy items.

7 AUTOMATED WAREHOUSING

Challenge
Physical distancing and sickness rates lower warehouse productivity.

Innovation
Fully automated warehousing and fulfillment systems.

3 Ways DHL can accelerate your innovation agenda during Covid-19 and beyond

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